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Title of Invention ORGANIC EL DISPLAY PANEL FOR IRRADIATING TO UPPER AND LOWER



## Abstract

An object of the present invention is to provide the double-way organic electroluminescent display panel for displaying in the bidirection of the terminal folder as being about the double-way organic electroluminescent display panel with the radiation and reducing the slimming and manufacture cost of the terminal.

The ITO electrode as to the invention, is patterned on the upper side of the glass substrates. And the organic layer consisting of the hole-transport layer, the light-emitting layer, and the trilaminar of the electron-transport layer the surface is evaporated to the plasma in the preprocessing (Pretreatment), and after forming the ITO electrode (+). By forming the ITO electrode used as the cathode electrode (-) on the upper side of the organic layer it characterizes that it is possible for the double-way radiation.

It has the effect that if the invention is applied, the terminal is manufactured with the little cost while having the room in the portable terminal like the dual folder instead of a plurality of panels on the space of the terminal since the display to double-way is possible through the azygous panel.



## Representative Drawing(s)

Fig. 4e



## Description

### ■ Brief Explanation of the Drawing(s)

The drawing which the drawing 1a, 1b, and 1c show the configuration of the terminal according to the conventional embodiment.

Figure 2 is a drawing showing the double-way organic electroluminescent display panel according to the embodiment of the present invention

The side view which the drawing 3a, and 3b show the double-way organic electroluminescent display panel according to a preferred embodiment of the present invention.

The drawing which the drawing 4a~4e shows the manufacturing process of the double-way organic electroluminescent display panel according to a preferred embodiment of the present invention.

Figure 5 is a side view showing the configuration of the double-way organic electroluminescent display panel according to another preferred embodiment of the present invention.

The description \* of the symbol about the main part of \* drawing.

2: upper plate 4: lower plate.

6: first panel 8: second panel.

10: penetration hole 12: liquid crystal panel.

14: glass substrates 16: ITO electrode.

18: organic layer 20: the ITO electrode.

### ■ Details of the Invention

#### ■ Purpose of the invention

##### ◆ The Technical Field to which the invention belongs and the Prior Art in that Field

The invention relates to the double-way organic electroluminescent display panel, and more specifically, to the double-way organic electroluminescent display panel which reduces the folder number of the terminal by using the azygous organic EL panel which interactively radiates.

As is known before, the organic electroluminescent display which is the self emitting display highlighted as the oncoming generation image display device has the structure of successively laminating the ITO (anode), the organic layer (Organic Layer: HTL/ETL/ETL), and the metal (cathode) on the transparent substrate.

The display is possible for as to the organic electroluminescent display having the structure of describing in the above, towards the ITO electrode used as the transparent electrode. And it becomes possible to apply to the dual folder which is the portable terminal which in this case, recently, obtains the phosphorus group from

the mobile phone market and it is necessary to have a plurality of panels. The Promega Corporation which the above-described dual folder type removes the disadvantage of looking at the display only when spreading the folder which is the disadvantage of the general folder.

#### ★ The Technical Challenges of the Invention

But in case of the conventional dual folder, as shown in figs. 1a and 1b, it is necessary to have a plurality of panels because of using the liquid crystal display element (LCD: Liquid Crystal Display) as the display panel. The terminal of the drawing 1a is made of the first panel (6), and the second panel (8) when folder was folded. The first panel (6) is seen through the upper plate (2). The second panel (8) seems to be equipped on the lower plate (4) when spreading for the call.

Even in case of just boring the display window of the square hall (10) shape in the upper plate (2) so that the liquid crystal panel (8) be seen even when folder was folded, folder has the terminal of the drawing 1c.

However, if the panel of 2 is adhered like the drawing 1a, and 1b in the panel manufacturing, the terminal manufacture cost is risen and since it is necessary to have the more many space in the terminal, it is impeded in the slim of the terminal.

An object of the present invention is to provide the double-way organic electroluminescent display panel being made in consideration of the circumstances of the above-described prior art, and for displaying in the bidirection of the terminal folder with the radiation and reducing the slimming and manufacture cost of the terminal.

#### ★ Structure & Operation of the Invention

To achieve the above object, according to a preferred embodiment of the present invention, provided is the double-way organic electroluminescent display panel which the ITO electrode is patterned on the upper side of the glass substrates, and evaporates the surface the organic layer consisting of the hole-transport layer, the light-emitting layer, and the trilaminar of the electron-transport layer to the plasma in the preprocessing (Pretreatment), and after forming the ITO electrode (+), and is possible for the double-way radiation by forming the ITO electrode used as the cathode electrode (-) on the upper side of the organic layer.

Preferably, provided is the double-way organic electroluminescent display panel possible that the double-way simultaneous driving is comprised by packaging to individually form the organic EL panel with a plurality of and face with the part formed into the metal electrode.

Hereinafter, referring to the figure, specifically, it illustrates for the invention.

Figure 2 is a schematical diagram of the configuration of the double-way organic electroluminescent display panel according to a preferred embodiment of the present invention.

The time which folded the upper plate (2) in order to adhere the azygous panel with reference to this and make the dual folder and the content that is displayed when the upper plate (2) being circulated and spreading folder are turned over and it has to be outputted.

The organic EL panel which at the same time, interactively can radiate in order to be displayed through the structure of describing in the above has to be manufactured. And because the organic electroluminescent display uses the uncertain metal as the structure cathode electrode, it is possible only the radiation of one side.

Therefore, at the same time, by using the transparent ITO electrode which is not uncertain metal in order to achieve the output of double-way, the cathode electrode has to be formed.

The drawing 3a, and 3b are the side view showing the device structure of the double-way organic electroluminescent display panel according to the invention.

In order to pattern the cathode electrode in both sides of the glass substrates (14) and it forms the organic layer (18) and ITO electrode (20) on the upper side and it has the manufacturing process of the existing organic EL panel (12) and structure of opposite the drawing 3a makes with reference to this. In this way, by altogether using the transparent substrate (14), it has to package the manufactured device in both side surface.

After patterning the ITO electrode (16) on the glass substrates (14) and forming the organic layer (18) on the upper side, it forms the ITO transparent electrode (20) on the upper side into the cathode electrode and the drawing 3b makes so that it be possible for the double-way display. This kind of structure is that the ITO electrode (20) damage does not go is formed in the organic layer (18) the ITO electrode (20) is formed after the organic layer (18) formation. Even if the panel is turned over whereas the manufacturing process is simple since being the passive matrix driver component, character and draft etc. are displayed.

The drawing 4a~4e is the drawing showing the manufacturing process of the double-way organic electroluminescent display panel according to a preferred embodiment of the present invention.

The ITO electrode (16) firstly is patterned on the upper side of the glass substrates (14) with reference to this. Next, the surface is decided on to the plasma with the preprocessing (Pretreatment).

At this time, it adds change to the composition ratio of the ITO electrode (16) and it more makes the work function of the ITO electrode (16) the reason for pre-processing the ITO electrode (16) to the plasma high toward the organic layer (18) next than the work function of the formed ITO electrode (16).

In the general ITO electrode (16) is the range of 4.8eV~5.6eV, it has the work function. And the work function is enhanced if the ITO thin film is pre-processed. Since not performing the plasma pretreating, relatively the work function is low and the ITO thin film formed in the upper side of the organic layer (18) uses as the cathode electrode.

In after forming the ITO anode electrode (16), the organic layer (18) is formed. And the organic layer (18) usually forms the hole-transport layer, the light-emitting layer, and the trilaminar of the electron-transport layer. In after forming the organic layer (18), the ITO electrode (20) used as the cathode electrode is formed on the upper side.

The organic EL panel as illustrated in drawing 4a~4e has to form anode and the cathode which is independently derived in order to be possible for application but at the same time, show the letter or character in terms of bidirectional because of using among two kinds of case only one when spreading if it is not as the time folded like the dual folder.

Figure 5 is a side view showing the organic EL panel structure according to another preferred embodiment of the present invention.

It packages this with reference to this to individually form the organic EL panel as illustrated in Figure 4e and face with the part formed into the metal electrode. The double-way simultaneous driving is the structure of being individually possible. In case of the organic EL panel of this structure, it is identical of the thing in which the manufacturing process is illustrated in the drawing 4a~4e. And like that manufactured two panels are combined and it is comprised.

The above-described organic EL panel of structure is effectively used in the same place with the Express bus terminal or the airport in which a plurality of peoples is gathered in comparison with the footprint space.

Referring to the figure, specifically, the function of the double-way organic electroluminescent display panel according to a preferred embodiment of the present invention of the above-described configuration and work for are illustrated the function are attached.

The ITO electrode (16) is patterned on the upper side of the glass substrates (14). Next, the surface is decided on to the plasma with the preprocessing (Pretreatment).

At this time, by adding change to the composition ratio of the ITO electrode (16) and more making the work function of the ITO thin film high toward the organic layer (18) next than the work function of the formed ITO electrode (16) the reason for pre-processing the ITO electrode (16) to the plasma the ITO electrode (16) the anode electrode.

In after forming the ITO anode electrode (16), the organic layer (18) is formed. And if the ITO electrode (20) used as the cathode electrode is formed on the upper side, the time folding the folder and the content that is displayed when the upper plate (2) being circulated and spreading folder are turned over and it is outputted.

Since interactively radiating through the structure of describing in the above, one panel is reduced in the terminal manufacture.

In the meantime, the double-way organic electroluminescent display panel in accordance with the preferred embodiments of the present invention is not restricted to the above described preferred embodiments, but may be modified variously within the scope of the technological concept.

#### ■ Effects of the Invention

As described above, the double-way organic electroluminescent display panel according to the invention has the effect that in the portable terminal like the dual folder, the terminal is manufactured with the little cost while having the room instead of a plurality of panels on the space of the terminal since the display to double-way is possible through the azygous panel.



#### Scope of Claims

##### Claim 1 :

The double-way organic electroluminescent display panel wherein the ITO electrode is patterned on the upper side of the glass substrates; the organic layer consisting of the hole-transport layer, the light-emitting layer, and the trilaminar of the electron-transport layer the surface is evaporated to the plasma in the preprocessing (Pretreatment), and after forming the ITO electrode (+); and it is possible for the double-way radiation by forming the ITO electrode used as the cathode electrode (-) on the upper side of the organic layer.

##### Claim 2 :

The double-way organic electroluminescent display panel of claim 1, wherein it is possible that the double-way simultaneous driving is comprised by packaging to individually form the organic EL panel with a plurality of and face with the part formed into the metal electrode.



#### Drawings

Fig. 1a

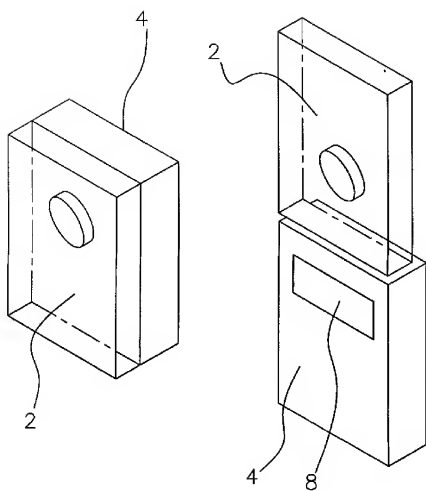


Fig. 1b

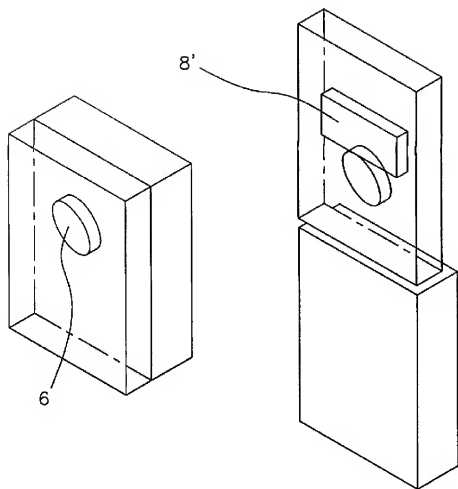


Fig. 1c

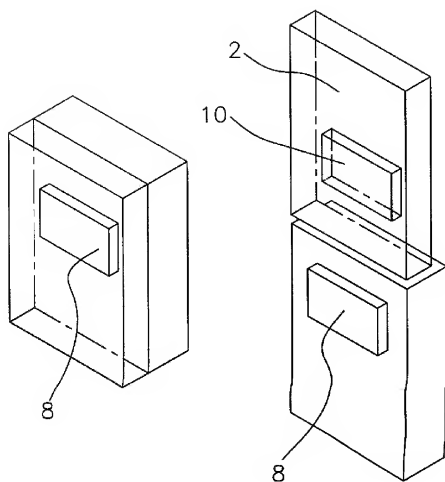


Fig. 2



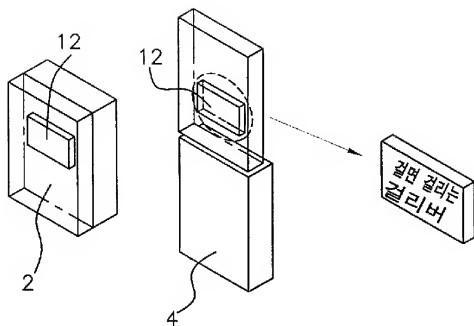


Fig. 3a

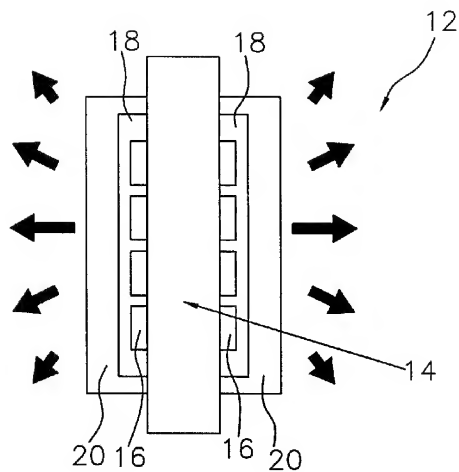


Fig. 3b

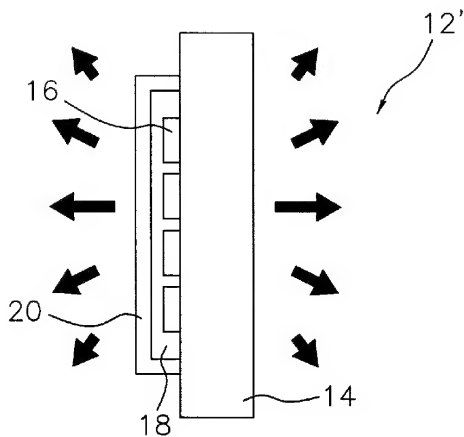


Fig. 4a

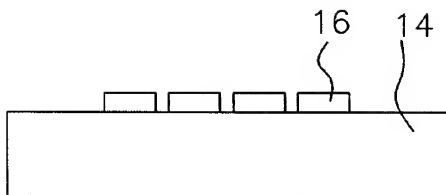


Fig. 4b

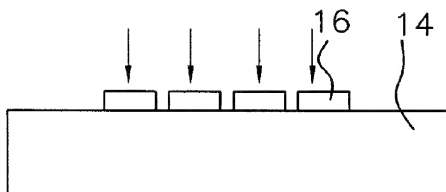


Fig. 4c

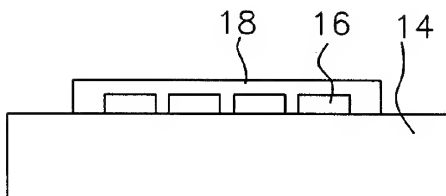


Fig. 4d

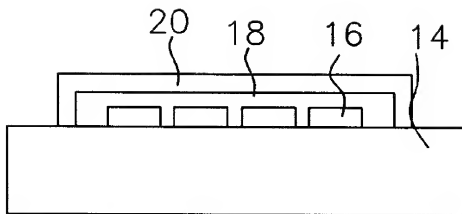


Fig. 4e

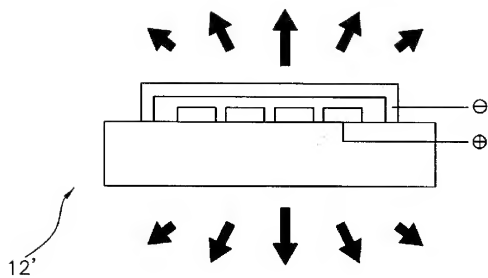


Fig. 5



